1988

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1988. *Transactions of the Nebraska Academy of Sciences,* XVI: 17-30.

BUTTERFLIES OF THE NIOBRARA VALLEY PRESERVE, NEBRASKA

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Seventy species of butterflies and skippers are reported from the Niobrara Valley Preserve. Twenty-four new county records are added to Brown County while 42 are added to the Keya Paha County checklist, bringing the total species/county to 63 and 67 respectively. Notes on numbers, flight periods, and habitat preferences are presented for each of the seventy species found on the Preserve. Twelve western and five eastern species reach their distributional limits in the Preserve area. Five hybrid butterflies involving three species of *Basilarchia* were captured on the Preserve.

† † †

INTRODUCTION

The Niobrara River region of north-central Nebraska has long been recognized as an area having significant biogeographic importance in the Great Plains. Pound and Clements (1900) described the unique occurrence of eastern and northern plant species in the Niobrara Valley. Tolstead (1942) identified the Niobrara Valley as a refuge for plant species of the boreal forest at the southern extent of their distribution, eastern deciduous forest species at the western extent of their distribution, and Rocky Mountain species at their eastern limit. Harrison (1980) identified 160 plant species that reach their distributional limit in the Niobrara River Valley.

The most striking feature of the Niobrara Valley is the co-occurrence of five distinctly different vegetation types within 1–2 miles of each other (Harrison 1980). The five vegetation types represented are: Rocky Mountain ponderosa pine forest, eastern deciduous forest (dominated by oak, elm, ash, and linden), boreal forest (dominated by paper birch), mixed prairie, and sandhills prairie.

Given such a unique mix of plant species and vegetation types, one would expect to find a unique mix of animal species also. Since butterfly distribution is limited, to a large extent, by the distribution of the host plant(s) used by the larvae, we expected to find range extensions for several species.

The major objective of this research was to determine the butterfly fauna of the Niobrara Valley Preserve which, previous to this study, was relatively poorly known. Other objectives were to determine the habitat preferences and relative abundance of species found.

METHODS

The Niobrara Valley Preserve is a 20,800 ha (52,000 acre) natural area located in north-central Nebraska. The Preserve is owned and managed by The Nature Conservancy.

Collecting was primarily limited to the eastern one-fourth of the Preserve, in Keya Paha and Brown counties. This portion of the Preserve contains all of the vegetation types listed above and has good plant species diversity. Sites selected for butterfly population counts were located where repeated counts could be made (e.g., nature trails) and which contained vegetation types needed.

Figure 1 shows and describes sites where collections and/or population counts were made from 1984 to 1987. Forty-one counts were taken on 26 dates during this period: 23–28 June 1984, 1–6 June 1985, 19–20 July 1985, 7 September 1985, 3 May 1986, 31 May–3 June 1986, 28 June 1986, 25–26 July 1986, 30–31 August 1986, and 11 July 1987. Site 1 was sampled on 5 occasions for a total of 14 hours, site 2 eight times for 48 hours, site 3 eight times for 51 hours, site 4 eight times for 19 hours, site 5 three times for 5 hours, site 6 four times for 9 hours, site 7 three times for 7 hours, and site 8 twice for six hours. The collection sites were sampled for a set distance, with the route passing through all vegetation types but varying somewhat on each occasion to include features (flowering plants, mud, etc.) that attracted butterflies. The number of each species seen or collected was recorded by vegetation type. The amount of time spent in each vegetation type was also recorded, along with climatic conditions.

When possible, at least 5 voucher specimens were collected of each species found. A collection containing a representative of each species (and both sexes if the species is dimorphic) is housed at the Preserve headquarters, while the remaining longer series of specimens is housed in the Kearney State College insect collection. Any questionable butterfly seen in the field was netted and if certain identification was not possible, it was collected.

Additional Preserve specimens collected by Steven M. Spomer and James M. Reiser of the University of Nebraska–Lincoln, and by Richard C. Rosche of Chadron, Nebraska, were examined and included in the Species Accounts.

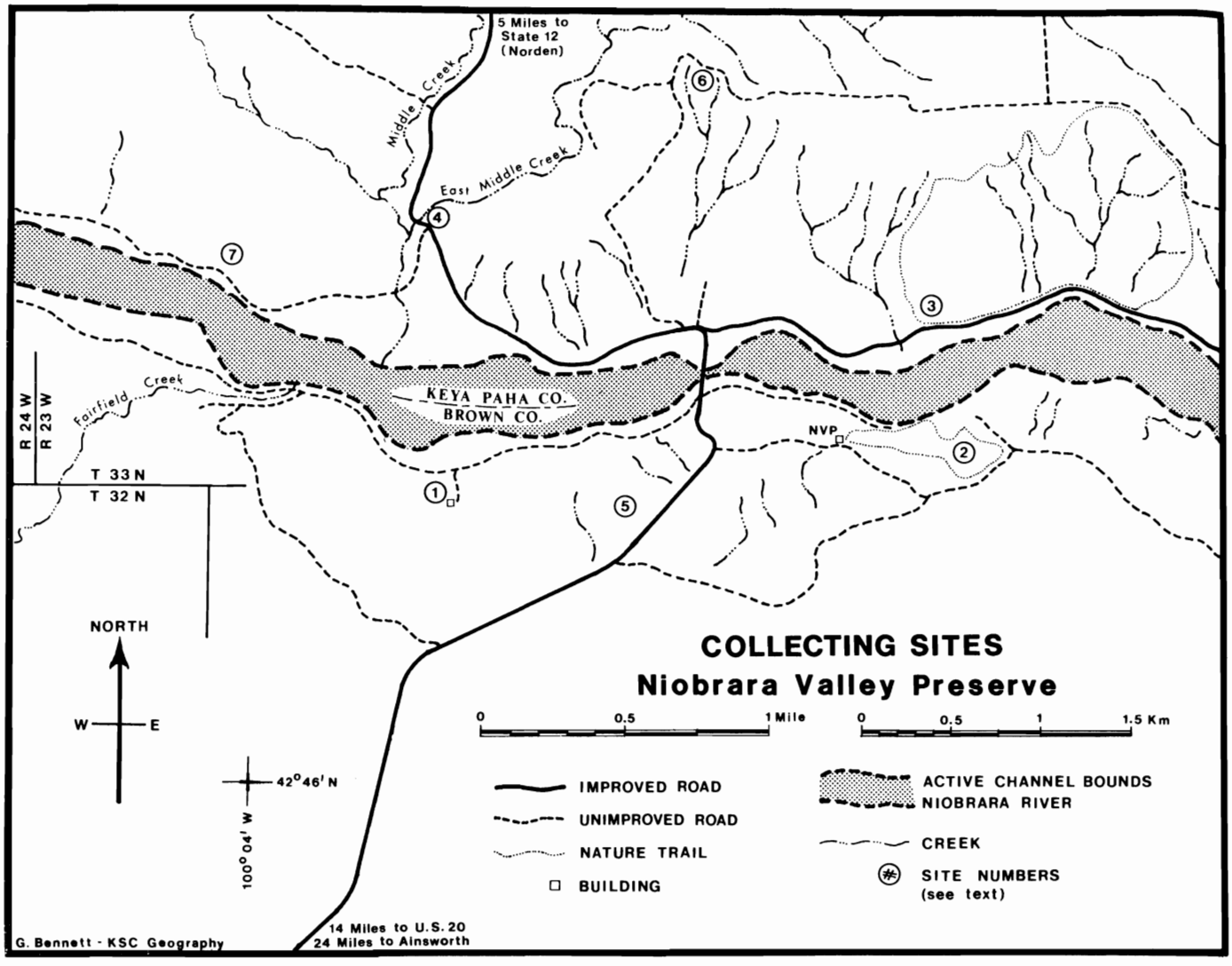

FIGURE 1. Collecting sites sampled at the Niobrara Valley Preserve.

Site 1: Mixture of habitats including weedy floodplain areas, north-facing pine hardwood forests, and ridgetop mixed prairies similar to those found at site 2. Sampling at this site consisted of walking a half-mile north-south transect.

Site 2: South Nature Trail east of the Niobrara Valley Preserve headquarters (NVP) on floodplain river terraces, north-facing slopes, and ridgetop prairies. The site encompassed a mixture of habitats including: **a.** deciduous forest (bur oak, *Quercus macrocarpa;* linden, *Tilia americana;* green ash, *Fraxinus pennsylvanica;* eastern red cedar, *Juniperus virginiana;* paper birch, *Betula papyrifera*); **b.** sandhills prairie (sand bluestem, *Andropogon hallii;* little bluestem, *Andropogon scoparius;* purple coneflower, *Echinacea angustifolia;* silky prairie clover, *Petalostemon villosum;* prairie coneflower, *Ratibida columnifera;* and gayfeathers, *Liatris* sp.); **c.** marsh and sandbar environments (sedges, *Carex* spp.; cattails, *Typha* sp.; bulrushes, *Scirpus* spp.; purple loosestrife, *Lythrum salicaria;* wild bergamot, *Monarda fistulosa;* willow, *Salix* sp.); and **d.** weedy floodplain. The sampling transect was 1 3/4 miles in length.

Site 3: North Nature Trail primarily composed of south-facing slopes and ridgetops, consisting of a variety of environments including: **a.** floodplain deciduous woodland (cottonwood, *Populus deltoides;* eastern red cedar, *Juniperus virginiana*); **b.** old-field or go-back prairie (little bluestem; sumac, *Rhus glabra;* yucca, *Yucca glauca*); **c.** pine forest (ponderosa pine, *Pinus ponderosa*); **d.** ridgetop mixed prairie (blue grama, *Bouteloua gracilis;* little bluestem; needle and thread, *Stipa comata;* side-oats grama, *Bouteloua curtipendula* and western wheatgrass, *Agropyron smithii;* along with associated forbs); **e.** weedy field (annual sunflower, *Helianthus annuus*); and **f.** weedy roadside and floodplain. The sampling transect was roughly 3 miles in length.

Site 4: (East Middle Creek) Habitats upstream from the East Middle Creek bridge consisting mainly of floodplain woodland (cottonwood; green ash; American elm, *Ulmus americana;* box elder, *Acer negundo;* and eastern red cedar), mixed prairie, and streamside vegetation (sweet clover, *Melilotus* sp.; fleabane, *Erigeron* sp.). Downstream from the East Middle Creek bridge habitats change to floodplain woodland, weedy riparian and sandbar-type vegetation. This transect ran roughly 1/2 mile along Middle Creek and East Middle Creek.

Site 5: Mixed prairie is the primary habitat at this site, consisting of little bluestem, sedges, needle and thread, and Scribner dichanthelim, *Dichanthelium oligosanthes* var. *scribnerianum*. The sampling consisted of a loop a half mile in length.

Site 6: This site is composed of mixed prairies and sloping pine woodlands, with species composition similar to those described in site 3. The sampling consisted of a mile long transect along the ridgetop.

Site 7: This site consists of hilly mixed prairie vegetation with abundant wildflowers. The sampling was a loop 3/4 mi. in length.

Site 8: (Plum Creek area) This site is approximately six miles to the south of the southern border of Figure 1. With the exception of an alfalfa field, this site contains habitats similar to those in sites 2 and 3 (pine hardwood and floodplain woodlands). The sampling consisted of a 3-mile loop.

SPECIES ACCOUNTS—INTRODUCTION

Numbers: Only positively identified specimens are included in these records. For species readily identifiable on the wing, the numbers presented are probably an accurate representation of populations present during the study. Positive identification for many species was possible only by capture and release (some blues, smaller nymphalids, and skippers), or by examination of pinned specimens (mostly skippers). Numbers obtained by these methods should not be construed to represent accurate accounts of total populations. These numbers, representing but a fraction of the total population, may be used as an indication of relative abundance.

In the species accounts, species whose numbers were determined primarily by enumeration of pinned specimens are designated by an asterisk placed by their numbers.

Collection Dates: Dates presented here represent the earliest and latest dates each species was found on the Preserve over a four-year period (1984–1987). Although individuals of each species almost certainly flew earlier and later than our data indicate, these dates should serve to roughly outline the flight periods for species found on the Preserve. Observations on numbers of generations for each species are discussed under Notes.

Notes: Sample sites where each species was found are listed. Brief notes are also given on habitat preferences, population size, voltinism, as well as some field observations. Species exhibiting range extensions are accompanied by a distributional map (Fig. 2a–2p).

Nomenclature follows Miller and Brown (1981) except for *Celastrina ladon (=C. argiolus)* and *(Coenonympha inornata (=C. tullia),* which follow Ferris and Brown (1980).

FIGURES 2a–2p. Nebraska distribution of species of special interest in this work. Adapted from Rosche (1986), and updated with the authors' 1986 and 1987 season supplements.

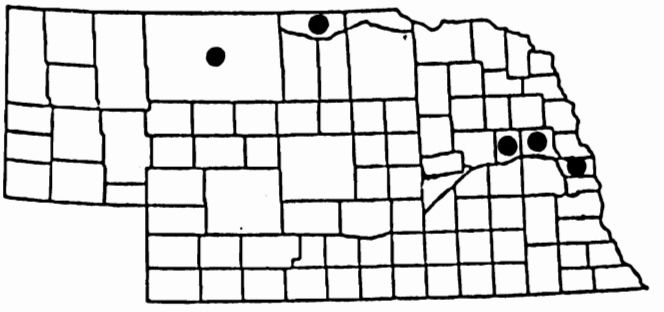

Fig. 2(a) - Erynnis juvenalis

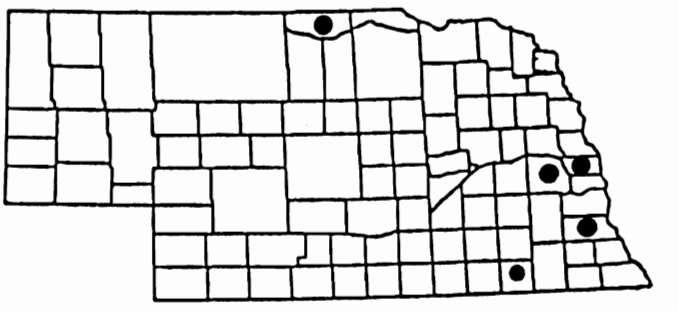

Fig. 2(b) - Erynnis horatius

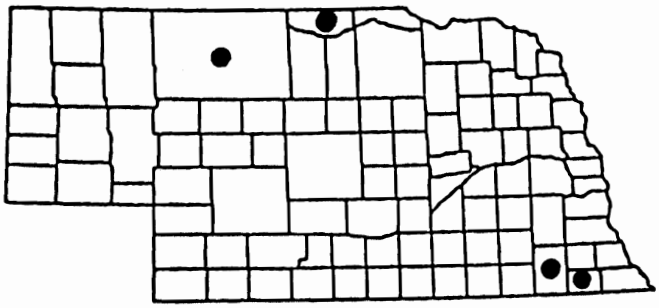

Fig. 2(c) - Erynnis baptisiae

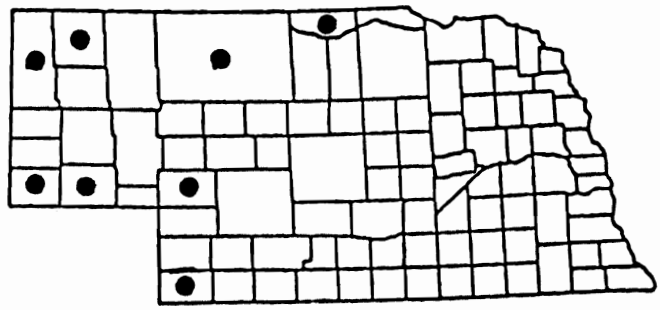

Fig. 2(d) - Hesperia uncas

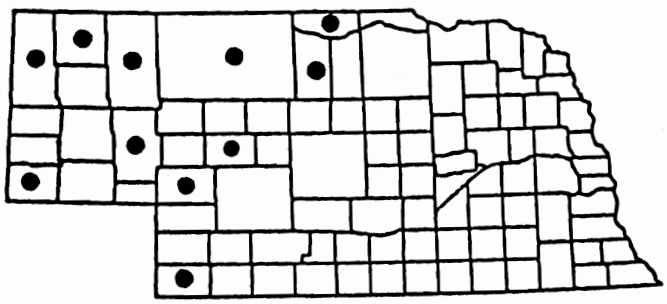

Fig. 2(e) - Hesperia comma

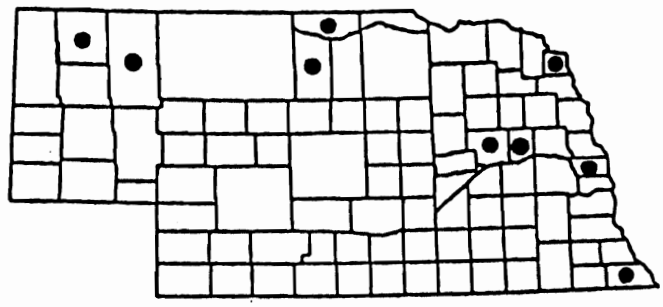

Fig. 2(f) - Wallengrenia egeremet

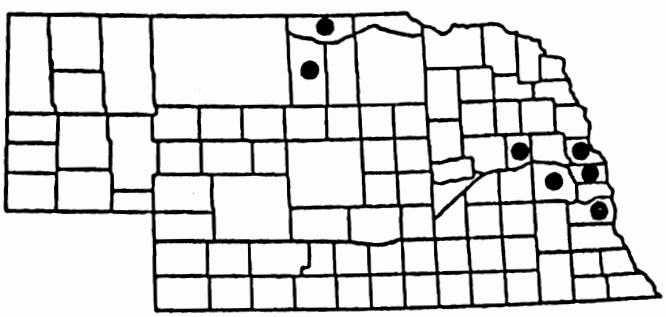

Fig. 2(g) - Pompeius verna

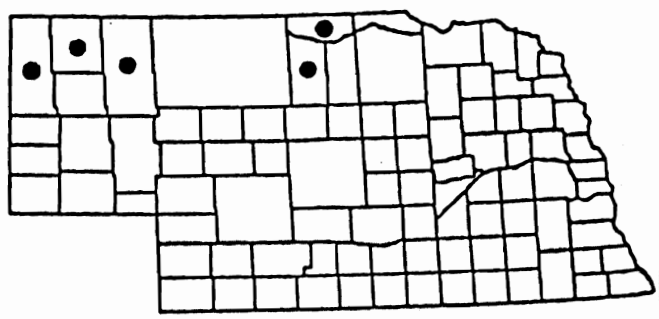

Fig. 2(h) - Poanes taxiles

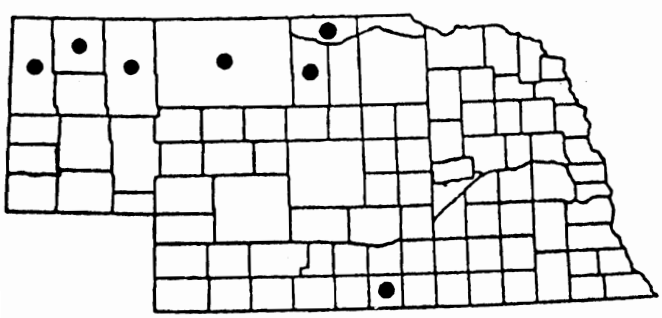

Fig. 2(i) - Amblyscirtes oslari

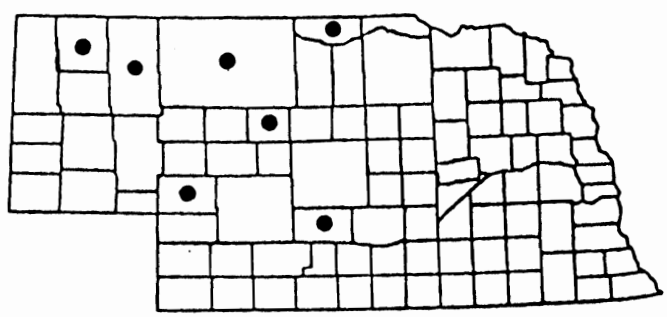

Fig. 2(j) - Megathymus texanus leussleri

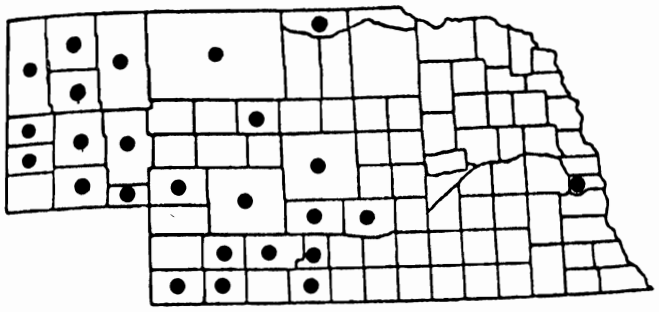

Fig. 2(k) - Pterourus multicaudata

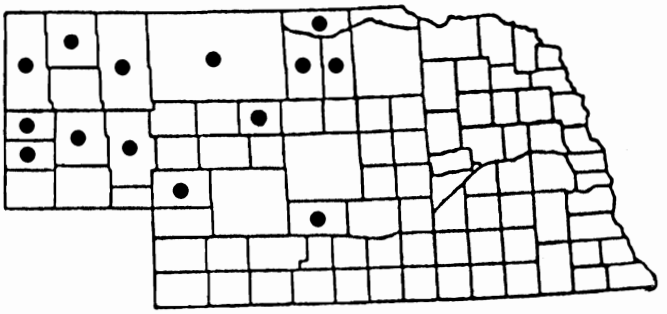

Fig. 2(l) - Mitoura siva

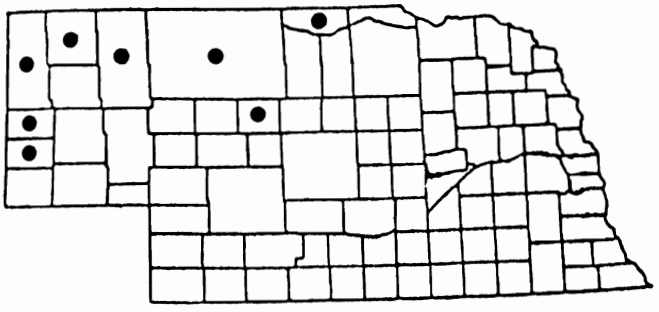

Fig. 2(m) - Incisalia eryphon

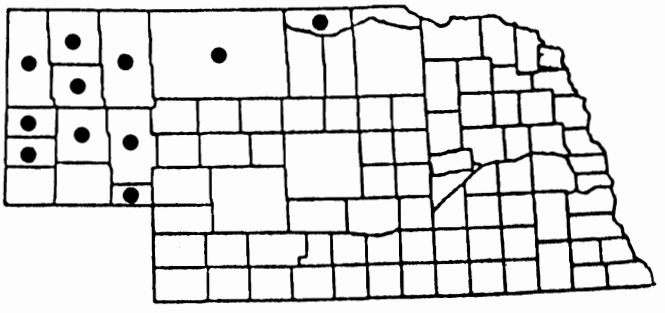

Fig. 2(n) - Speyeria edwardsii

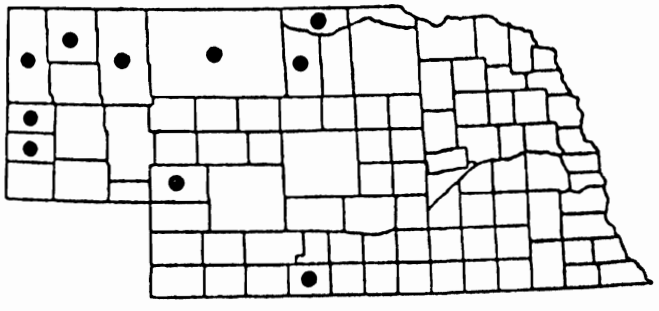

Fig. 2(o) - Basilarchia weidemeyerii

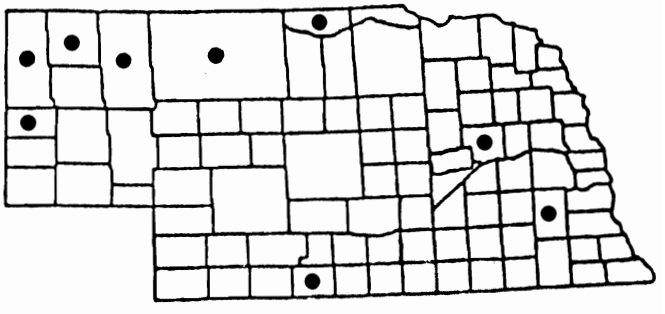

Fig. 2(p) - Coenonympha tullia COMPLEX

SPECIES ACCOUNTS

Family Apaturidae

Anaea andria Scudder—"Goatweed Butterfly"

Numbers: 7 on 3 counts

Collection Dates; 18 May–27 July

Notes: Sites 2 & 7. Most specimens were found adjacent to floodplain roadways, either on open ground or leaf litter. In 1984, two *A. andria* were found in small trees on low hills in Cherry County. The high count for the study was four at site 2 on 19 July 1985.

Asterocampa celtis (Boisduval & LeConte)—"Hackberry Butterfly"

Numbers: 25 on 13 counts

Collection Dates: 1 June–31 August

Notes: Sites 1, 2, 3, 4, 6, & 8. Although rarely numerous (counts ranged from one to four), this butterfly could be found in a variety of habitats ranging from lowland mud to drier ridgetop environments. The common thread linking all these sightings was their close proximity to deciduous woodlands. While June adults were most common, late August sightings indicated the occurrence of at least two generations annually.

Family Danaidae

Danaus plexippus (Linnaeus)—"Monarch"
Numbers: 75 on 21 counts
Collection Dates: 31 May–7 September
Notes: Sites 1, 2, 3, 4, 6, 7, & 8. This species utilized habitats ranging from streambeds to ridgetop areas. It was, however, usually represented by only an individual or two on most counts. The exception came on 31 August 1986, when 27 were found at collection site 3, all on ridgetops overlooking the Niobrara River from the north, with many of these monarchs taking nectar from sunflowers. Six of these were tagged (in conjunction with the Monarch Project) in an effort to better understand monarch migration. None of these were recovered. It is interesting to note that a count taken across the river the previous day at site 2 yielded no monarchs.

Family Hesperiidae

Amblyscirtes oslari (Skinner)—"Oslar's Roadside Skipper"
Numbers: *9 on 4 counts
Collection Dates: 31 May–25 June
Notes: Sites 1, 2 & 6. It could be found on open slopes and ravines, frequently perching on uneven bare ground or low vegetation. Although not abundant, this species was found during two study years (three in 1985 and five in 1986). High count for the study was 5 from site 6 on 31 May 1986. *A. oslari* appears to be univoltine on the Preserve. With the exception of a stray south-central Nebraska record (Franklin Co.), the Preserve's Keya Paha and Brown county records are the easternmost of Nebraska's seven county records for this western skipper (Fig. 2i).

Amblyscirtes vialis (W.H. Edwards)—"Roadside Skipper"
Numbers: 9 on 5 counts
Collection Dates: 1 June–11 July
Notes: Sites 2, 3 & 7. It was not found on the Preserve in 1985. The three 1986 spring specimens were rather worn, a likely indication that the peak of the spring flight had already passed. These three specimens came from grassy slopes and floodplains. No second generation was observed in 1986. However, the occurrence of a second generation of *A. vialis* was later documented when specimens were found at collection sites 2 and 4 on 11 July 1987.

Ancyloxypha numitor (Fabricius)—"Least Skipperling"
Numbers: 14 on 4 counts
Collection Dates: 6 June–7 September
Notes: Taken from sites 2, 4, and from the north bank of the Niobrara River directly north of the Preserve headquarters. Multiple broods of this small skipper flew along waterways on the Preserve, becoming more numerous as the season progressed. High count for the study was 7 on 7 September 1985 in riverside vegetation, their preferred habitat, although several were also found on barren sandbars.

Atrytone arogos (Boisduval & LeConte)—"Beard-grass Skipper"
Numbers: 3 on 2 counts.
Collection Dates: 28 June–26 July
Notes: Sites 3 & 7. Specimens were taken from low grassy hills. A second generation, reported sporadically in Nebraska, was not found on the Preserve.

Atrytone logan (W. H. Edwards)—"Delaware Skipper"
Numbers: 5 on 4 counts
Collection Dates: 27 June–25 July
Notes: Sites 1, 2, 6 & 7. It was found on grassy floodplains, sometimes ranging up into low hills.

Atrytonopsis hianna (Scudder)—"Dusted Skipper"
Numbers: 18 on 9 counts
Collection Dates: 19 May–24 June
Notes: Sites 1,2, 3, 4, 6 & 7. Most specimens were collected from grassy ridgetops although several were found ranging down slopes, while one was found in a creekbed. The high count occurred on 2 June 1986, when 6 were found on site 3 ridgetops. The spring brood was the only one observed.

Epargyreus clarus (Cramer)—"Silver-spotted Skipper"
Numbers: 13 on 6 counts
Collection Dates: 1 June–19 July
Notes: Sites 1, 2, & 3. Found in a variety of habitats ranging from moist riverine sandbars to more xeric slopes and ridgetops, in the vicinity of wooded areas in the last two cases. Most sighting dates were in June, but the high count was on 19 July 1985, when five were found at site 2.

Erynnis baptisiae (Forbes)—"Wild Indigo Duskywing"
Numbers: *1 on 1 count
Collection Date: 28 June 1986
Notes: Site 6. Our lone specimen was found midway down a moderately wooded (primarily deciduous) ravine leading down to East Middle Creek. An *Erynnis* sighted on 31 August 1986 at a site 3 ridgetop was either this species or *E. horatius,* both of which are bivoltine. There are verified records of *E. baptisiae* from four Nebraska counties (Fig. 2c), including Keya Paha on the Preserve. The Preserve record is an apparent "rediscovery" of the species in north-central Nebraska. A Cherry County specimen in the University of Nebraska collection is dated 1902.

Erynnis horatius (Scudder and Burgess)—"Horace's Duskywing"
Numbers: *1 on 1 count
Collection Date: 20 June 1987
Notes: Site 1. The lone representative of this species, a female, was collected in Brown County by Steven M. Spomer (pers. comm.). It has been recorded from only five Nebraska counties, of which Keya Paha is the farthest northwest (Fig. 2b).

Erynnis juvenalis (Fabricius)—"Juvenal's Duskywing"
Numbers: *5 on 5 counts
Collection Dates: 17 May–2 June
Notes: Sites 2 & 4. It was most often found flying in or near creekbeds or riverbanks during its univoltine spring flight. Taken from only five Nebraska counties (Fig. 2a), of which Cherry County and the Preserve's Keya Paha County are the farthest west. Captures during two study years would seem to indicate a stable resident population.

Euphyes ruricola (Boisduval)—"Dun Skipper"
Numbers: *39 on 7 counts
Collection Dates: 28 June–25 July
Notes: Sites 1, 2, 3, 4, 5, & 6. High counts for both years were from site 2 (16 in 1985 and 7 in 1986). Preferred habitats were creekbeds and woodland borders near rivers. Collection data indicate one flight for this species.

Hesperia comma (Linnaeus)—"Common Branded Skipper"
Numbers: *2 on 2 counts
Collection Dates: 31 August–7 September
Notes: Sites 3 & 5. The specimens, both males, were found on grassy slopes. One (1985) was taken from a gayfeather (*Liatris* sp.) flower. The worn condition of both specimens indicates a probable flight period of mid- to late August, a time period during which we were unable to collect. Records from Nebraska indicate that the species inhabits the more xeric western half of the state. Keya Paha and Brown county records from the Preserve represent eastern range extensions in northern Nebraska (Fig. 2e).

Hesperia leonardus pawnee Dodge—"Pawnee Skipper"
Numbers: 261 on 8 counts
Collection Dates: 30 August–7 September
Notes: Sites 2, 3, 4, 5 & 7. This skipper can probably be found throughout the Preserve when it flies in a single generation in late August through early September. During that time it was a frequent visitor to flowers—gayfeathers (*Liatris* spp.) and sunflowers (*Helianthus* spp.) in particular. The abundance of this species is illustrated by our count of 124 skippers on sunflowers along a one-mile stretch of roadside on 31 August 1986.

Hesperia ottoe W. H. Edwards—"Ottoe Skipper"
Numbers: *12 on 5 counts
Collection Dates: 28 June–26 July
Notes: Sites 2, 3, 4 & 5. It was found in roughly equal numbers in both riparian areas and low hillsides. High counts were at sites 2 and 3 on 19–20 July 1985 when four were found at each site.

Hesperia uncas W. H. Edwards—"Uncas Skipper"
Numbers: *1 on 1 count
Collection Date: 31 August 1986
Notes: Site 3. Ferris and Brown (1981) indicated that this species is bivoltine throughout its range. The collection date for the Preserve specimen appears to indicate that it was part of a second generation. The lone specimen, a female, is the easternmost record for Nebraska, except for a possible old record from Dodge County (Barber, 1894). The remaining seven county records are scattered to the west and south (Fig. 2d).

Megathymus texanus leussleri Holland—"Strecker's Giant Skipper"
Numbers: 4 on 3 counts
Collection Dates: 6 June–21 June
Notes: Sites 3 and 6. This species was found on the Preserve in Keya Paha County three successive years (1985–1987), but was never common, being represented most often by lone individuals. Two were found on open slopes and ridgetops in 1985 at site 6, while single specimens were found in similar habitats by James M. Reiser and Steven M. Spomer (pers. comm.) at site 3 the next two years. Distribution in Nebraska is generally western, with the Preserve's Keya Paha County records being, along with Dawson County to the south, the easternmost of the seven Nebraska counties in which this species has been found (Fig. 2j).

Pholisora catullus (Fabricius)—"Common Sootywing"
Numbers: 68 on 17 counts
Collection Dates: 17 May–30 August
Notes: Sites 1, 2, 3, 4, 6, 7 & 8. This species was most common around weedy floodplain areas, although ridgetop specimens were also found. In the latter case it seemed to prefer depressions and ravines over exposed higher ground. Highest counts occurred in early June (15 at site 2) and late July (10 at site 3), indicating the presence of two generations.

Poanes hobomok (Harris)—"Hobomok Skipper"
Numbers: *15 on 5 counts
Collection Dates: 1–27 June
Notes: Sites 1 & 2. For the most part the Preserve's univoltine *P. hobomok* could be found frequenting flowers on the Niobrara River floodplain, occasionally straying onto open wooded slopes. Early June flights prevailed in 1985 and 1986 (high count was 9 on 5 June 1985 at site 2) in contrast with 1984 when this skipper was numerous in late June (24–27 June).

Poanes taxiles (W. H. Edwards)—"Golden Skipper"
Numbers: 16 on 5 counts
Collection Dates: 28 June–25 July
Notes: Sites 2 & 4. Captures in three years indicate that a resident population of this western skipper occurs on the Preserve. While it is not abundant, investigation of moist habitats along the Niobrara River and smaller streams in mid-July rarely failed to yield at least a few. Lower portions of ravines were occasionally utilized also. The highest population encountered was on 19 July 1985, when seven were found at site 2, with an additional four being found at site 4. Other than Preserve records from Brown and Keya Paha counties, it has been found in only three other counties in Nebraska, these being located in the northern Panhandle (Fig. 2h).

Polites coras (Cramer)—"Yellowpatch Skipper"
Numbers: 3 on 2 counts
Collection Dates: 3 June and 20 August
Notes: Sites 1 & 4. The few *P. coras* we found were in moist floodplain areas or in creekbeds. Two of the three were on flowers—a thistle species and blue verbena (*V. hastata* L.). Collection dates indicate the species is double-brooded on the Preserve.

Polites mystic (W. H. Edwards)—"Long Dash"
Numbers: *4 on 3 counts
Collection Dates: 27 June–20 July
Notes: Sites 1, 2 & 4. This species occupied creekbeds and moister floodplain areas, flying in a single generation.

Polites origenes (Fabricius)—"Crossline Skipper"
Numbers: *16 on 5 counts
Collection Dates: 2 June–20 July
Notes: Sites 22, 3, 6 & 7. This skipper was found on slopes and ridgetops—drier environments than those in which *P. coras* or *P. mystic* were found. Collection data might be interpreted in several ways. 1985 data show one early capture on 6 June, with the next taken on 19 July. Opler and Krizek (1984) indicate that *P. origenes* is bivoltine in all but the northernmost portions of its range. Thus, in 1985, *P. origenes* appeared to be double-brooded. On the other hand, 1986 captures were restricted to late June, possibly indicating that only one generation occurred that year.

Polities themistocles (Latreille)—"Tawny-edged Skipper"
Numbers: *7 on 6 counts
Collection Dates: 19 May–6 June
Notes: Sites 1, 4 & 6. It was found primarily on grassy hills and ridgetops, although one was found near East Middle Creek. While a second generation is not uncommon in other portions of Nebraska, a second flight was not observed on the Preserve.

Pompeius verna (W. H. Edwards)—"Little Glassywing"
Numbers: *3 on 3 counts
Collection Dates: 28 June–19 July
Notes: Sites 2 & 4. This species was restricted to moist streamside areas. It is double-brooded in southern portions of its range (Opler and Krizek, 1984), but apparently not on the Preserve. Although this species appears to be somewhat rare on the Preserve, it should be noted that only pinned specimens could be positively identified since females of this species, *Euphyes ruricola*, and *Wallengrenia egeremet* all flew together and were indistinguishable in the field. Taking this into account, along with the presence of this species on consecutive years, there appears to be a small but stable population of *P. verna* along streamsides on the Preserve. *P. verna* from Brown and Keya Paha counties are the westernmost Nebraska records for this somewhat uncommon skipper, the remaining five being clustered in the east-central portion of the state (Fig. 2g).

Pyrgus communis (Grote)—"Common Checkered Skipper"
Numbers: 21 on 11 counts
Collection Dates: 4 June–7 September
Notes: Sites 2, 3, 4, 5, 7 & 8. The checkered skipper is usually not a permanent resident north of the 40th parallel (Opler and Krizek, 1984). Upon its arrival from the south this immigrant was observed in creekbeds and alfalfa fields, and on floodplains, slopes and ridgetops, but never in large numbers. High count for the study was 6 at site 3 on 20 July 1985.

Thorybes pylades (Scudder)—"Northern Cloudywing"
Numbers: 31 on 11 counts
Collection Dates: 31 May–27 June
Notes: Sites 1, 2, 3, 4, 6, 7 & 8. While occasionally found on floodplains and in creekbeds, it was found in greatest numbers on the upper half of slopes (generally open-wooded with grasses) up to ridgetops. In these habitats puccoon (*Lithospermum* sp.) was often common and utilized as a nectar source. The northern cloudywing was single-brooded on the Preserve.

Wallengrenia egeremet (Scudder)—"Northern Broken Dash"
Numbers: *21 on 7 counts
Collection Dates: 19–26 July
Notes: Sites 1, 2, 3, & 4. Most *W. egeremet* collected came from moist riparian habitats (17 specimens), while the remaining four were found scattered up grassy hillsides to ridgetops. Although the species is double-brooded southward (Opler and Krizek, 1984), it is represented by a single generation on the Preserve. Preserve records span three years of the study, suggesting a stable resident population. Considering that other specimens on the wing were not tallied, the capture of 18 *W. egeremet* in 1985 represents as large a population of this species as has yet been recorded in Nebraska; it is known from nine counties (Fig. 2f).

Family Lycaenidae

Celastrina argiolus (Linnaeus)—"Spring Azure"
Numbers: 9 on 2 counts.
Collection Dates: 28 June–25 July
Notes: Sites 2 & 4. The spring azure was most abundant at site 2 on 25 July 1986 (8 sighted). While usually considered an early spring flier, the species' first flights apparently escaped notice. Observed habitats were largely open areas adjacent to waterways, although one specimen was taken from an open deciduous woodland.

Everes comyntas (Godart)—"Eastern Tailed Blue"
Numbers: 23 on 7 counts.
Collection Dates: 17 May–31 August
Notes: Sites 1, 2, 3 & 7. Multiple broods of this species inhabited areas of low growth on flood plains, occasionally wandering onto slopes. Solitary individuals were most often encountered. An exception was a 30 August 1986 count at site 2 (riverside) when 15 were counted.

Harkenclenus titus (Fabricius)—"Coral Hairstreak"
Numbers: 6 on 3 counts
Collection Dates: 20 June–25 July
Notes: Sites 2 & 3. Four were taken from a ridgetop at site 3 in 1985. The lone 1986 specimen was taken from sand barrens adjacent to the Niobrara River (site 2). James M. Reiser (pers. comm., 7 July 1987, Lincoln, Nebraska) reported sighting another on 20 June 1987.

Hemiargus isola (Reakirt)—"Reakirt's Blue"
Numbers: 12 on 6 counts
Collection Dates: 31 May–31 August
Notes: Sites 1, 3, 6 & 7. This non-resident southern species was not found on the Preserve in 1985 but was found throughout the 1986 season. No particular habitat appeared to be favored, with specimens being taken from weedy floodplain areas, roadways, and prairies on slopes and ridgetops. Lone individuals were generally the rule, the exception being 28 June 1986 when six were found at site 7 around flowers and on mud.

Hyllolycaena hyllus (Cramer)—"Bronze Copper"
Numbers: 10 on 4 counts.
Collection Dates: 6 June–30 August
Notes: *H. hyllus* was found only at site 4 where June sightings were most common. Three late August sightings indicate the occurrence of a second generation. The high count for the study was on 6 June 1985 when five were found in creekbed vegetation.

Incisalia eryphon (Boisduval)—"Western Pine Elfin"
Numbers: 2 on 2 counts.
Collection Dates: 3 May–1 June
Notes: Sites 3 and 4. Daisy fleabane (*Erigeron strigosus* Muhl.) flowers were being utilized by the specimen taken from East Middle Creek's streambed (site 4). Habitat for the earlier site 3 capture was more typical habitat—slopes with broken strands of ponderosa pine (*Pinus ponderosa* Laws.). An additional Keya Paha County specimen was taken by Richard C. Rosche (pers. comm.) on 3 May 1986 about a mile east of site 3. Collecting conditions on that date were somewhat less than ideal, hence this species may be more numerous in its annual spring flight than collection data indicate. Its range is limited to the distribution of its larval host-plant, *Pinus ponderosa* Laws., a tree more common in western Nebraska, but extending eastward as far as Brown and Keya Paha counties along the Niobrara River. As would be expected, the Keya Paha County Preserve records are the easternmost of the eight Nebraska counties where this species has been found (Fig. 2).

Lycaeides melissa (W. H. Edwards)—"Orange-bordered Blue"
Numbers: 49 on 16 counts
Collection Dates: 17 May–7 September
Notes: This is the commonest blue on the Preserve, being found at sites 1, 2, 3, 4, 6, 7 & 8. It is largely an inhabitant of grassy to rocky open slopes and ridgetop prairies, although individuals were found in streambeds (site 4) on several occasions. The first flight was generally completed by mid-June, with the second flight commencing in late July. The highest count occurred on 1 June 1986, when nine were found on flowers at site 7.

Mitoura siva (W. H. Edwards)—"Juniper Hairstreak"
Numbers: 87 on 12 counts
Collection Dates: 19 May–26 June
Notes: Sites 1, 2, 3, 4, 6, 7 & 8. Adults could be found on ridgetops, slopes, and floodplains, with the greatest number found on floodplain sites 1 and 4 (20 and 36 respectively). It was attracted to a number of flowers including willow (*Salix* sp.), ragwort (*Senecio* sp.), daisy fleabane (*Erigeron strigosus* Muhl.), yellow sweet clover (*Melilotus officinalis* (L.) Lam.), and, to a lesser extent, puccoon (*Lithospermum* sp.). The discovery of a few fresh adults on the Preserve in late June and at other Brown County locations as late as 10 July might indicate that at least a partial second generation occurs in north-central Nebraska. At the present time the distribution in Nebraska is primarily western, although the species appears to be expanding its range. Preserve records from Keya Paha and Brown counties are on the eastern fringe of its presently known range (Fig. 21).

Strymon melinus Hübner—"Gray Hairstreak"
Numbers: 2 on 2 counts
Collection Dates: 31 May & 30 August
Notes: Both captures were from floodplain areas (sites 2 & 4). The date spread indicates multiple generations. The late May specimen was worn and tattered while the late August individual was quite fresh.

Family Nymphalidae

Basilarchia archippus (Cramer)—"Viceroy"
Numbers: 92 on 9 counts
Collection Dates: 3 June–7 September
Notes: Sites 1, 2, 4 & 8. Viceroys on the Preserve were largely restricted to streambeds and willow-lined sandbars adjacent to the Niobrara River. Most of the sightings came from site 2 (13 on 3 June 1986, 33 on 25 July 1986, and 27 on 20 August 1986). Our data indicate that it was double- to triple-brooded.

Basilarchia arthemis astyanax (Fabricius)—"Red-spotted Purple"
Numbers: 46 on 13 counts
Collection Dates: 1 June–7 September
Notes: Sites 1, 2, 3, 4, 6 & 8. It was found in a variety of habitats, including streamside areas, deciduous woods with open understory, and ridgetop areas. The high count was recorded at a ridgetop area (site 6) where 10 individuals were found (6 June 1985). Counts of seven were recorded twice at site 2 during 1986 (25 July and 30 August). Collection data indictate a minimum of two generations, and a possible third.

Basilarchia weidemeyerii (W. H. Edwards)—"Weidemeyer's Admiral"
Numbers: 13 on 6 counts
Collection Dates: 1 June–11 July
Notes: Sites 1 & 3. Most individuals flew along the borders of woodlands (primarily deciduous), both at the base of hills and at hilltops. In addition to Preserve sightings, another six were sighted in riparian habitats while we canoed a 25-mile stretch of the Niobrara River (between Valentine and Rocky Ford in Cherry, Keya Paha, and Brown counties) on 7 June 1985. This indicates the likelihood that additonal colonies occur at numerous points along the Niobrara River to the west of the Preserve. However, at the present time the Niobrara Valley Preserve is as far east as this species has been found in Nebraska (Fig. 2o). This western species is normally univoltine throughout its range, but Ferris and Brown (1981) have suggested the possibility of a partial second generation in areas near Denver, Colorado. We observed only the normal single flight on the Preserve.

Basilarchia weidemeyerii* × *Basilarchia archippus
Numbers: 1 on 1 count
Collection Date: 27 July 1986
Notes: Taken from site 4. This hybrid was taken on vegetation along East Middle Creek. The pairing producing this hybrid almost certainly occurred in the spring of the same year. In contrast with *B. weidemeyerii* × *B. arthemis astyanax* hybrids, in which the larvae apparently overwinter, larvae resulting from *B. weidemeyerii* × *B. archippus* pairings appear to develop directly, emerging as adults later the same year. Platt, Rawson and Balogh (1978) have reported three other instances in which four other "wild" *B. weidemeyerii* × *B. archippus* hybrids have been taken, all these coming from the east slope of Colorado's front range with collection dates ranging from 1894 to 1973. Platt (pers. comm., 13 April 1987, Catonsville, Maryland, Austin P. Platt) has gathered data for six additional captures of "wild" hybrids between these two species (including the Preserve record), bringing to ten the number of known *B. weidemeyerri* × *B. archippus* hybrids reported from the wild.

Basilarchia weidemeyerii* × *Basilarchia arthemis astyanax
Numbers: 4 on 4 counts
Collection Dates: 1 June–21 June
Notes: Sites 1, 2 & 3. Two of these hybrids were taken from margins of deciduous woodlands on bluffs south of the Niobrara River in 1985. The remaining two specimens were taken by James M. Reiser (pers. comm.) from sparsely wooded slopes north of the

Niobrara River in 1986 and 1987. Hybrids between these two species flew in June, at the same time as univoltine *B. weidemeyerii,* while multiple broods of *B. arthemis astyanax* could be found nearly the entire summer. Ferris and Brown (1981) have suggested the possibility of a partial second generation of *B. weidemeyerii* near Denver, Colorado. As this was not observed on the Preserve and we observed no late summer hybrids between these two species, it would appear that the matings producing these hybrids must occur when *B. weidemeyerii* flies in the spring. If *B. weidemeyerii* is univoltine, as suspected, then genes from this species most likely are determining development and diapause among the immature stages of the hybrids, which most likely have overwintered successfully as larvae, judging from their early season collection dates. Although these two species have been successfully crossed under laboratory conditions (Remington, 1958), hybrids collected from the wild are considered rare. Platt (pers. comm.) has indicated that he has knowledge of only ten such hybrids (including the four found on the Preserve) taken from the wild, the remaining six coming from Colorado, Arizona, and New Mexico.

Charidryas gorgone (Hübner)—"Gorgone Crescentspot"
Numbers: 7 on 4 counts
Collection Dates: 31 May–28 June
Notes: Sites 1, 4 & 7. All sightings occurred around disturbed floodplain areas. Adults were observed on daisy fleabane (*Erigeron strigosus* Muhl.), ragwort (*Senecio* sp.) and at mud. A second generation, not uncommon to much of Nebraska, was not observed during this study.

Charidryas nycteis (Doubleday & Hewitson)—"Silvery Crescentspot"
Numbers: 11 on 6 counts
Collection Dates: 6 June–19 July
Notes: Sites 1, 4 & 6. Collections in 1984 yielded eight captures in three days, 26–28 June. The remaining records came in 1985. Utilized habitats were generally creeksides and floodplains, although there was one ridgetop capture. No second generations were observed during our study.

Euptoieta claudia (Cramer)—"Variegated Fritillary"
Numbers: 15 on 10 counts
Collection Dates: 3 May–31 August
Notes: Sites 1, 2, 3, 6, 7 & 8. Utilized habitats were floodplains, along with open woods, slopes and ridgetops. While this southern species is unable to overwinter as far north as the Preserve, it appeared as early in the spring as 3 May, and could be found during the remainder of the season. In spite of this, it was rarely numerous, the high count for our study being three at collection site 8 on 4 June 1985.

Junonia coenia Hübner—"Buckeye"
Numbers: 15 on 4 counts
Collection Dates: 25 July–30 August
Notes: Sites 2, 3 & 4. This southern species was not recorded on the Preserve in 1985. However in 1986, a year when numerous southern species made inroads into Nebraska, it arrived in late July and flew until the season's end. Its habitat preference was nearly identical to that of another southern species, *Nathalis iole,* both preferring open sandy areas with little or no vegetation. Fourteen out of 15 sightings occurred in these habitats along the Niobrara River (site 2) and East Middle Creek (site 4).

Nymphalis antiopa (Linnaeus)—"Mourning Cloak"
Numbers: 12 on 7 counts
Collection Dates: 17 May–7 September
Notes: Sites 1, 2, 3, 4 & 6. Half of our sightings came on 17 May 1985, when six somewhat worn adults were observed clustered about the base of a clump of willows (*Salix* sp.) on the Niobrara River floodplain. The remaining six were sighted singly, with three inhabiting ridgetops and three in riparian situations.

Phyciodes tharos (Drury)—"Pearly Crescentspot"
Numbers: 73 on 15 counts
Collection Dates: 17 May–7 September
Notes: Sites 1, 2, 3, 4, 6 & 7. For the most part *P. tharos* inhabited only flood plains and creekbeds, the exceptions being occasional ridgetop sightings. Highest numbers were recorded in early June, 1986, when 13 were found on or near ragwort (*Senecio* sp.) at site 1, and 19 were found at site 4, mostly on daisy fleabane (*Erigeron strigosus* Muhl.).

Polygonia comma (Harris)—"Comma"
Numbers: 16 on 5 counts
Collection Dates: 18 May–21 July
Notes: Sites 1, 2 & 4. It was largely restricted to moist wooded riparian areas where one of its larval hostplants (*Urtica dioica* L.) was found. Highest numbers were found during late June 1984 when approximately one dozen were found on moist sandbars in the East Middle Creek streambed.

Polygonia interrogationis (Fabricius)—"Question Mark"
Numbers: 4 on 3 counts
Collection Dates: 28 June–30 August
Notes: Sites 2, 6 & 7. This species exhibited a bit more versatility than did *P. comma* in habitat selection. It was found in habitats ranging from deciduous tree margins on hilltops to partially wooded ravines to roadside mud on floodplains.

Speyeria cybele (Fabricius)—"Great Spangled Fritillary"
Numbers: 51 on 9 counts
Collection Dates: 28 June–7 September
Notes: Sites 2, 3, 4 & 7. It was most abundant in mid to late July. High count for our study was 27 at site 2 on 25 July 1986. Preferred habitats were floodplain prairies, creekbeds, and deciduous woodlands with open understory.

Speyeria edwardsii (Reakirt)—"Edwards' Fritillary"
Numbers: 17 on 3 counts
Collection Dates: 6 June–28 June
Notes: Sites 3 & 6. This fritillary flew earlier and had a shorter flight period than other *Speyeria* on the Preserve. Its habitat was also more restricted, with *S. edwardsii* found at borders of ponderosa pine forests on slopes and ridgetops north of the Niobrara River, contrasting with *S. idalia* and *S. cybele,* which preferred riparian environments. Distribution of this species in Nebraska is generally western, with the Keya Paha County populations being the easternmost records in the state (Fig. 2n). Captures during two years of the study would seem to indicate a stable resident population.

Speyeria idalia (Drury)—"Regal Fritillary"
Numbers: 4 on 3 counts
Collection Dates: 28 June–30 August
Notes: Sites 3 & 4. Observed habitats were prairies and streamsides.

Vanessa atalanta (Linnaeus)—"Red Admiral"
Numbers: 94 on 23 counts
Collection Dates: 3 May–31 August
Notes: Sites 1, 2, 3, 4, 6, 7 & 8. It showed no preference for any particular habitat, utilizing streamsides, weedy floodplain areas, open slopes and ridgetops. Numbers of this species were roughly the same for 1985 and 1986. Highest counts for each year occurred in July at site 2.

Vanessa cardui (Linnaeus)—"Painted Lady"
Numbers: 14 on 10 counts
Collection Dates: 3 May–7 September
Notes: Sites 1, 2, 3, 4, 6 & 7. This migrant from the south was never numerous (high count: 4 at site 1, 4 June 1985) with most records consisting of sightings of lone individuals. It appeared with equal frequency in both ridgetop and riparian areas.

Vanessa virginiensis (Drury)—American Painted Lady"
Numbers: 3 on 3 counts.
Collection Dates: 3 May–31 August
Notes: Sites 3 & 8. This resident species was found on slopes and ridgetops dominated by ponderosa pine (*Pinus ponderosa* Laws.), with only lone individuals captured. The spread in collection dates indicates at least two generations.

Family Papilionidae

Pterourus glaucus (Linnaeus)—"Tiger Swallowtail"
Numbers: 36 on 10 counts.
Collection Dates: 5 June–30 August
Notes: Sites 2, 3, 4 & 6. It was sighted most frequently along tree margins on ridgetops, although lone *P. glaucus* were occasionally found in open woods and prairies. This species was most common in late July. One dark-form female was taken from site 3.

Pterourus multicaudata (W. F. Kirby)—"Two-tailed Tiger Swallowtail"
Numbers: 1 on 1 count.
Collection Dates: 20 July 1985
Notes: The lone representative of this species was found on a thistle blossom atop a ridge at collection site 3. This Keya Paha County record is on the eastern edge of this species range in Nebraska (Fig. 2k).

Family Pieridae

Artogeia rapae (Linnaeus)—"Cabbage White"
Numbers: 36 on 8 counts
Collection Dates: 3 May–7 September
Notes: Sites 2,3, 4 & 7. This multivoltine species most often frequented weedy floodplains and streamsides. The 3 May 1986 sighting of 5 individuals was the only early-season sighting; the remainder were after mid-July. The highest count was 10 on 30 August 1986 at site 2.

Colias eurytheme Boisduval—"Orange Sulphur"
Numbers: 294 on 29 counts.
Collection Dates: 3 May–7 September
Notes: Taken from all sites (1–8). Multiple generations flew throughout the study, utilizing a wide variety of habitats, with sunlit areas containing flowering plants being frequented most often. The largest count was on a heavily-flowered hillside (site 7) on 28 June 1986, when 34 were sighted.

Colias philodice Godart—"Common Sulphur"
Numbers: 7 on 2 counts.
Collection Dates: 30–31 August 1986.
Notes: Sites 3 & 4. Habitats utilized were open slopes and streamsides. Numbers of this species were probably greatly under-reported. Due to the possible confusion between worn and faded *C. eurytheme* only actual captures of *C. philodice* were recorded. However the late summer occurence coincides with our data from Rowe Sanctuary (Buffalo County, Nebraska) where *C. philodice* was almost non-existent until late summer, when it suddenly appeared in numbers approaching that of *C. eurytheme*.

Euchloe olympia (W. H. Edwards)—"Olympia Marblewing"
Numbers: 5 on 2 counts.
Collection Dates: 3 May 1986.
Notes: Sites 2 & 3. This univoltine spring butterfly was most frequently found in open weedy areas.

Nathalis iole Boisduval—"Dwarf Yellow"
Numbers: 41 on 6 counts.
Collection Dates: 25 July–7 September
Notes: Sites 2, 3, 4 & 7. During our study this southern species did not arrive until about mid-summer, but by season's end it could usually be found along roadsides and open sandy areas adjacent to waterways. Peak counts occurred on 7 September 1985, when 14 were found on sandbars at site 2, and 25 July 1986 at the same location where 20 were sighted.

Pontia protodice (Boisduval & LeConte)—"Checkered White"
Numbers: 64 on 16 counts
Collection Dates: 3 May–7 September
Notes: Sites 1, 2, 3, 4, 6 & 7. While several generations of this species flew annually, it was numerous only occasionally (10 sighted on counts twice). Preferred habitat was weedy floodplain, although individuals were occasionally found on ridgetop prairies.

Pyrisitia lisa (Boisduval & LeConte)—"Little Yellow"
Numbers: 1 on 1 count
Collection Date: 11 July 1987
Notes: Site 2. Our lone representative of this southern species was found in an open area on the Niobrara River floodplain. While not overwintering in Nebraska, this species commonly invades southeastern Nebraska during the summer months, where it breeds until cooler weather sets in. It is, however, uncommon in northern Nebraska, with the Brown County record from the Preserve being the northernmost in the state.

Zerene cesonia (Stoll)—"Dogface Butterfly"
Numbers: 11 on 3 counts.
Collection Dates: 18 May–7 September
Notes: Sites 3 & 7. Collection dates indicate the presence of at least two generations. Habitats frequented were roadsides along waterways, although there was one ridgetop sighting. The largest concentration was found in early September, taking nectar from sunflowers. In the past, Nebraska captures of this "southern" butterfly have generally been regarded as migrants. However, recently it has been suggested by some (Ely, et al. 1986, and Pyle, 1981) that adults may occasionally overwinter. This theory might be supported by the mid-May capture of a somewhat worn *Z. cesonia,* as well as by the presence of this species for two consecutive years when it was not particularly abundant in more southern portions of the state.

Family Satyridae

Cercyonis pegala (Fabricius)—"Large Wood Nymph"
Numbers: 516 on 14 counts
Collection Dates: 28 June–7 September
Notes: Sites 2, 3, 4, 6 & 7. Peak concentrations of the single-brooded *C. pegala* were found in mid- to late July. Several counts of 100+ individuals were tallied at sites 2 and 3. Deciduous woodlands, ridgetop prairies, and flood plains were all utilized as habitats. Consistently high numbers could be found frequenting purple loosestrife (*Lythrum salicaria* L.) along the Niobrara River (site 2).

Coenonympha tullia (Müller)—"Prairie Ringlet"
Numbers: 1 on 1 count
Collection Date: 17 May 1985
Notes: Taken from site 4. Our lone specimen was taken from the base of a hill on an abandoned roadway. Records of *C. tullia* from nine counties in Nebraska are primarily northwestern (Fig. 2p). Distribution outside the state is western and northern, depending on the subspecies being considered. Some current taxonomists lump a confusing array of *Coenonympha* (including, among others, what were formerly considered to be *C. ochracea* and *C. inornata*) into the *tullia* complex. Paul A. Opler (pers. comm.) examined our specimen and was of the opinion that it could be called *C. tullia inornata*. Leussler (1938) considered *Coenonympha* he captured in Cherry County (which encompasses roughly half the Preserve) to be *C. inornata*. On the other hand, Johnson (1972), who did not have an opportunity to examine Leussler's specimens, deleted *C. inornata* from his treatise on Nebraska butterflies, listing instead *C. o. ochracea* which had been taken in Dawes and Sioux counties in the Nebraska panhandle. The discovery of *C. tullia inornata* on the Preserve lends credence to Leussler's assertion that *C. inornata* could be found in north-central Nebraska.

Enodia anthedon A. H. Clark—"Northern Pearly Eye"
Numbers: 14 on 2 counts
Collection Dates: 11 July–25 July
Notes: Sites 2 & 4. All specimens were found in gently sloping deciduous woodlands with open understory.

Megisto cymela (Cramer)—"Little Wood Satyr"
Numbers: 45 on 7 counts
Collection Dates: 24 June–26 July
Notes: Sites 1, 2, 3, 4, & 6. Habitats utilized were floodplains, creekbeds, and open wooded areas on slopes. A site 4 count on 28 June 1986 tallied 12 specimens, the high for our study. These were found in the lower half of a ravine leading down to East Middle Creek.

CONCLUSIONS

The butterfly fauna of the Niobrara Valley Preserve is largely a reflection of the combination of plant communities that reach their limits there. Of the 70 butterfly species found on the Preserve, 16 are at the edge of their range. Most of these are western butterflies, many of which are common in the Rocky Mountains. Western species reaching the easternmost portions of their range on the Preserve include *Amblyscirtes oslari, Basilarchia weidemeyerii, Coenonympha tullia, Hesperia comma, H. uncas, Incisalia eryphon, Megathymus texanus leussleri, Mitoura siva, Poanes taxiles, Pterourus multicaudata,* and *Speyeria edwardsii.*

In addition, a number of eastern species reach the western edge of their range on the Preserve, these being *Erynnis baptisiae, E. horatius, E. juvenalis,* and *Pompeis verna.* Most of these species are normally associated with eastern deciduous woodlands. The Niobrara Valley Preserve is also home to what is perhaps the most abundant population of the rather uncommon *Wallengrenia egeremet* found in Nebraska.

The Brown, Keya Paha, Cherry county area is apparently as far west as good numbers of *Basilarchia arthemis astyanax* can be found in Nebraska. This is significant in that here it meets with small populations of *B. weidemeyerii* from the west. Four hybrids between these two species were taken from the Preserve between 1985 and 1987, indicating that this cross occurs in the area with some regularity. One hybrid between *B. weidemeyerii* and *B. archippus* (a species occurring statewide) was also found.

ACKNOWLEDGMENTS

Al and Lois Steuter of The Nature Conservancy provided hospitality during this research. For help in the field, we thank Robin Harding; Lanny Randolph; Lana, Paul, Andy, and Tom Bishop; Glennis Nagel; and Denise Fritz. James Reiser and Steve Spomer shared their data. Identifications and verifications were kindly provided by Richard Rosche, Ray Stanford, Paul Opler, and Clifford Ferris. Gordon Bennett provided the graphics.

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